

A NEW SPECIES OF *TAPEINOSTEMON* (GENTIANACEAE)
FROM THE CHOCÓ OF NORTHERN ECUADOR

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ABSTRACT

The core range of the neotropical genus *Tapeinostemon* (Gentianaceae) in the Guayana Highlands comprises six species endemic to tepui formations, while two further species occur in the Andes. *Tapeinostemon zamoranum* Steyerem. ranges from southern Colombia through Ecuador and Peru to Bolivia on Amazon-facing slopes, while **T. adulans** J.R. Grant, sp. nov. occurs on Pacific-facing slopes of the Chocó region in northern Ecuador. Inflorescence architecture and seed anatomy indicate that the new species is more closely related to *T. spenneroides* Benth. of the Guayana Highlands than to the geographically proximate *T. zamoranum*.

KEY WORDS: *Tapeinostemon*, Gentianaceae, Ecuador

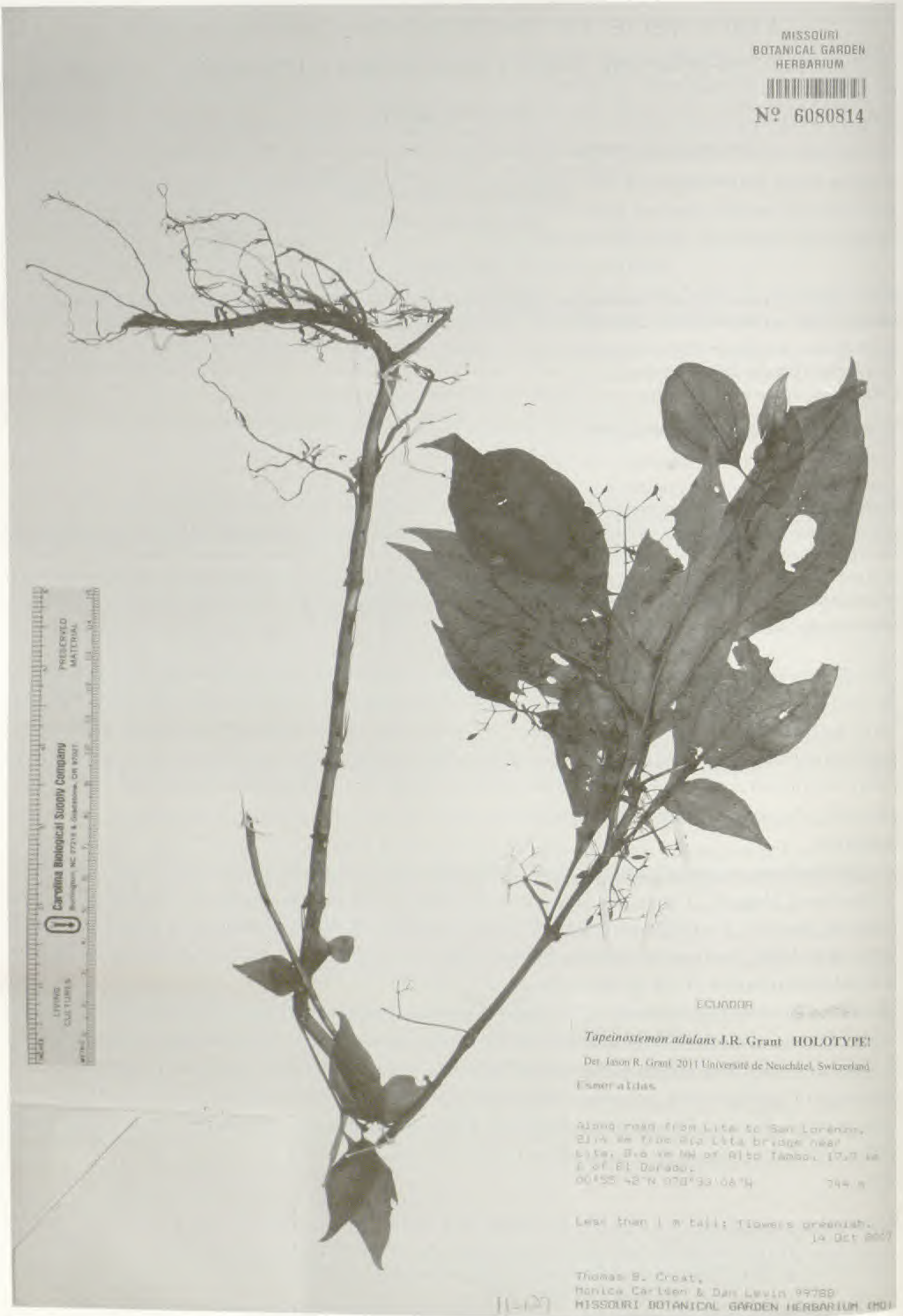
RESUMEN

El núcleo de distribución del género neotropical *Tapeinostemon* (Gentianaceae) en las Guayana Highlands comprende seis especies endémicas de las formaciones tepui, mientras que las otras dos especies están en los Andes. *Tapeinostemon zamoranum* Steyerem. se distribuye desde el sur de Colombia por Ecuador y Perú hasta Bolivia en las laderas orientadas hacia el Amazonas, mientras que **T. adulans** J.R. Grant, sp. nov. está en las laderas orientadas al Pacífico de la región del Chocó en el norte de Ecuador. La estructura de la inflorescencia y la anatomía de la semilla indican que la nueva especie está más relacionada con *T. spenneroides* Benth. de las Guayana Highlands que con la más cercana geográficamente *T. zamoranum*.

While examining specimens of neotropical Gentianaceae at the Missouri Botanical Garden for work largely on *Macrocarpaea* (Grant 2011; Grant & Trunz 2011), a distinctive specimen came to light. With John Pruski and Ron Liesner we determined that this was a member of the small genus *Tapeinostemon*. Species of this genus range from annual to perennial herbs that are woody at the base. The pentamerous flowers are positioned in lax axillary to terminal cymes, and depending on species are distinctly nodding or not (Struwe et al. 1999; Struwe et al. 2002). The seeds are minute with a reticulate testa with numerous important characters for species differentiation.

Tapeinostemon occurs primarily on tepui formations of the Guayana Highlands with six species: *T. breweri* Steyerem. & Maguire, *T. jauaensis* Steyerem. & Maguire, *T. longiflorum* Maguire & Steyerem., *T. rugosum* Maguire & Steyerem., *T. sessiliflorum* (Humb. & Bonpl. ex Schult.) Pruski & S.F. Sm. and *T. spenneroides* Benth. (Struwe et al. 1999). Two species occur in the Andes: the first *Tapeinostemon zamoranum* Steyerem., which has the broadest distribution of any species in the genus, ranges across several biogeographic zones from southern Colombia to the Amotape-Huancabamba region of southern Ecuador and northern Peru, to the Cordillera Central of Peru and northern Bolivia, always on Amazon-facing slopes; the second is a new species, *T. adulans* J.R. Grant described here, which occurs on Pacific-facing slopes of the Chocó region northern Ecuador. The distribution of *Tapeinostemon*, a Guayana Highland-centered genus with several species also occurring in the Andes, is similar to that of *Bonyunia* (Loganiaceae), *Potalia* (Gentianaceae), and *Tachia* (Gentianaceae) (Grant 2009); yet in *Tapeinostemon* there is an absence of a widespread species in the Amazon basin as in the other three.

Tapeinostemon adulans J.R. Grant, sp. nov. (Figs. 1, 4 E–F). TYPE: ECUADOR. ESMERALDAS: along road from Lita to San Lorenzo, 21.4 km from Río Lita bridge near Lita, 8.6 km NW of Alto Tambo, 17.7 km E of El Dorado, 00 55'42"N, 078 33'06"W, 744 m, less than 1 m tall, flowers greenish, 14 Oct 2007, Thomas B. Croat 99788, with Monica Carlson & Dan Levin (HOLOTYPE: MO).



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ECUADOR

Tapeinostemon adulans J.R. Grant HOLOTYPE!

Det. Jason R. Grant, 2011 Université de Neuchâtel, Switzerland
Esmeraldas

Along road from Lita to San Lorenzo,
2.1 km W side Rio Lita bridge near
Lita, 8.6 km NW of Rio Tambo, 17.7 km
E of El Dorado.
00°55'42"N 078°33'08"W 794 m

Less than 1 m tall; flowers greenish.
14 Oct 2007

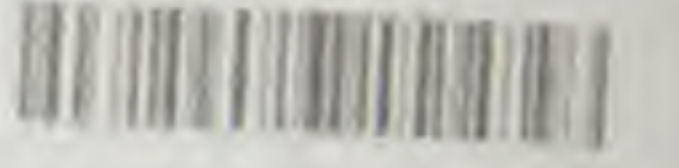
Thomas B. Croat,
Monica Carlsen & Dan Levin 99788
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FIG. 1. Holotype of *Tapeinostemon adulans* J.R. Grant (Croat 99788 [MO]). Photo Neil Villard.



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Flora of Ecuador

Tapeinostemon zamoranum Gentianaceae

Benth. det. J. Homeier

Province of Zamora-Chunchipe, area of the Estacion Cientifica San Francisco (S
01°58' W 78°04' E, road Loja-Zamora, ca. 55 km from Loja, terrace tropical forest
altitude(m): 2150

leg.: J. Homeier

obs.: terrestrial herb, lvs, white corolla

Herbaria: QCNE, LOJA, MO, BIEL

dup: 4

10.09.03

No. 1258

Map dynamics and growth dynamics of tree species from insular tropical rain forest,
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FIG. 3. Specimen of *Tapeinostemon zamoranum* Steyerl. (Homeier 1258 [MO]). Photo Neil Villard.

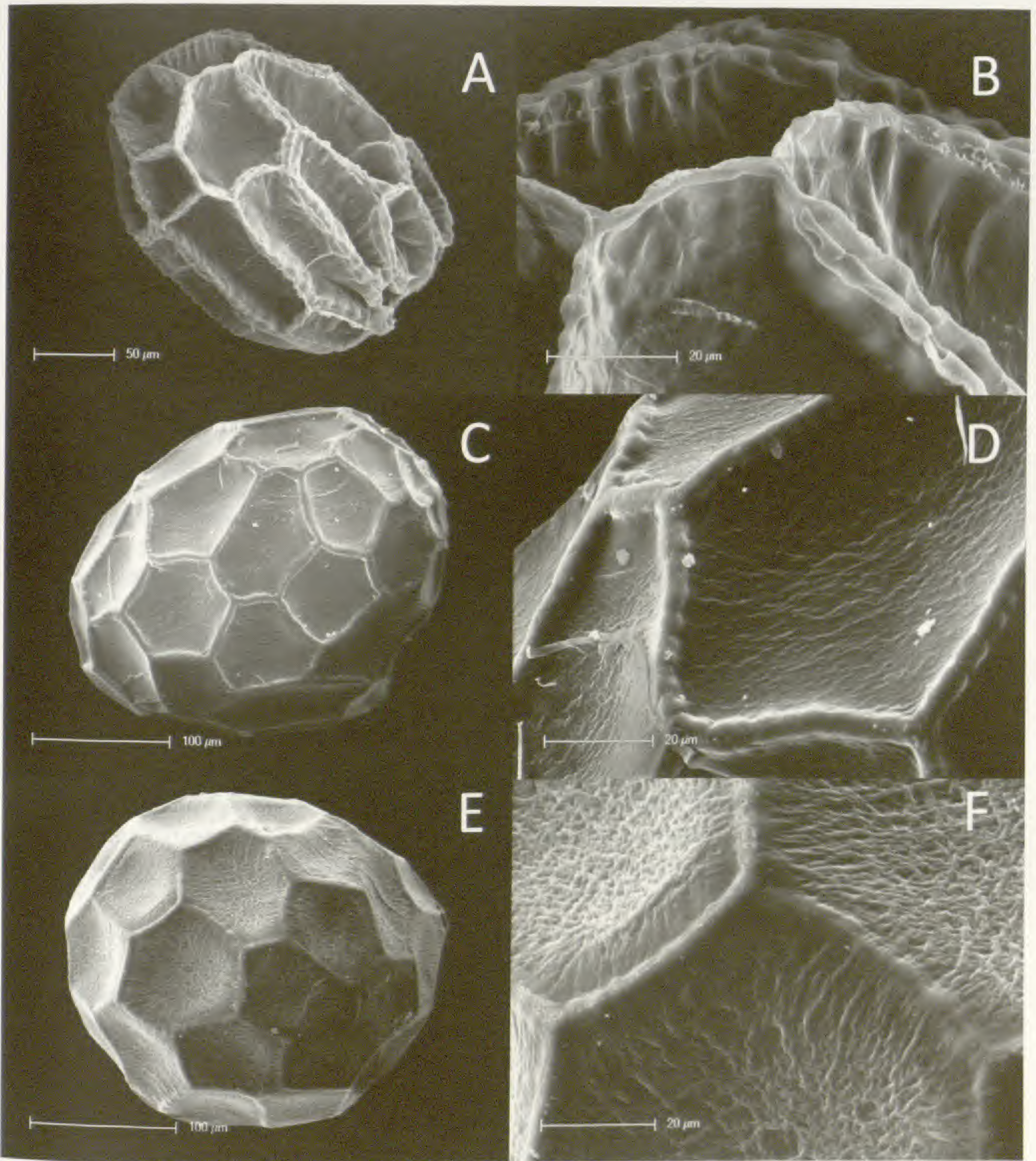


FIG. 4. Seed morphology of *Tapeinostemon*. A–B. *T. zamoranum* from Grant 4684 (NY), C–D. *T. adulans* from Croat 99788 (MO), E–F. *T. spenneroides* from Maguire et al. 42053 (MO). Photos M. Leboeuf.

A *Tapeinostemon spenneroides* Steyerem. cui affinis, sed plantis brevioribus (0.5 m vs. 1–3 m), calycibus brevioribus (1.0–1.5 mm vs. 1.0–2.0 mm), corollis brevioribus (1.5–2.5 mm vs. 4–6 mm), et seminibus globosis differt.

Unbranched herb 0.5 m tall, glabrous throughout. Stems rounded below to quadrangular above. Leaves (40–)130–140 mm long, long-petiolate; petioles (3–)20–25 mm long, blades lanceolate to ovate, (37–)110–120 × (16–)37–43 mm, entire, thin; leaf base attenuate and decurrent on the petiole; leaf apex acuminate. Inflorescences: lax axillary cymes, 30–78 mm long; branches spreading laterally, 5–20 mm long, 4–10 laxly flowered per branch. Lower bracts lanceolate to ovate, decreasing in size and becoming obovate toward the apex of the

TABLE 1. Seed anatomy of *Tapeinostemon*.

	<i>T. adulans</i>	<i>T. spenneroides</i>	<i>T. zamoranum</i>
Color	Solid reddish-brown	Solid reddish-brown	Golden translucent
Length and width	225–250 × 200–250 μm	250–300 × 200–240 μm	200–250 × 155–180 μm
Shape	Globose to ovoid, as a geodesic sphere or spherical fullerene [buckminsterfullerene or buckyball or soccer-ball shaped]	Elliptic to ovoid, as a disordered spherical fullerene	Elliptic to ovoid
Testa	Reticulate with regular polygonal cells (pentagonal and hexagonal); cells shallowly concave	Reticulate with regular to irregular polygonal cells (pentagonal and hexagonal, some lengthened with the elliptic seed shape; cells shallowly concave	Reticulate with irregular polygonal cells (square, pentagonal to hexagonal) of uneven size and length; cells deeply concave
Anticlinal walls	Straight, only slightly raised and thickened; therefore each seed appears as faceted sphere	Straight to curving, thick, raised vertically to sloping; inner walls with irregular bead-like thickenings	Straight to curving, thin, strongly raised vertically; inner walls with band-like thickenings
Cuticle	Matte; crater-like with a radiating rugose surface	Shiny; smooth to covered in faint regular striations	Shiny; smooth to traversed with band-like thickenings from the anticlinal walls

inflorescence; lower bracts petiolate, upper bracts sessile; bract petioles 0–3 mm; bracts 2–14 × 0.5–32 mm; bract base cuneate to attenuate and decurrent on bract petiole; bract apex obtuse to acuminate. Flowers pedicellate, pedicels 1–8 mm. Sepals separate to the base, glabrous, ecarinate, narrowly triangular, 1.0–1.5 × 0.25–0.33 mm, apex acuminate to acute. Corolla funnel-shaped, 1.5–2.5 × 0.33–0.5 mm, greenish (Croat 99788), corolla lobes less than 0.5 mm long, corolla lobe apex acute. Androecium and gynoecium unknown (too few flowers to risk damaging the specimen). Capsules ellipsoid to obovoid, 3–5 × 1–2 mm, rugose, bilocular, each locule with around 80 seeds (ca. 160 seeds per fruit). Seed characters in Table 1.

Morphology and similarities.—*Tapeinostemon adulans* (Fig. 1) is distinct in being an unbranched 50 cm tall herb with short axillary inflorescences and globose-shaped seeds. It is similar to *T. spenneroides* (Fig. 2) in its overall form, inflorescence architecture, leaf shape, non-undulating leaf margins, and seed morphology, but differs in its short stature, smaller calyx 1.0–1.5 vs. 1.0–2.0 mm long, smaller corolla 1.5–2.5 vs. 4–6 mm, and seed characters listed below. *Tapeinostemon zamoranum* (Fig. 3) has crenate undulating leaf margins, flowers that are distinctly nodding, and an unique seed morphology. In the key to species of *Tapeinostemon* by Struwe et al. (1999), both *T. adulans* and *T. zamoranum* will key to *T. spenneroides*.

Seed morphology.—The seeds of *Tapeinostemon spenneroides* have been characterized by Bouman et al. (2002). Here, the seeds of two additional species *T. adulans* (Fig. 4 E–F) and *T. zamoranum* (Fig. 4 A–B) as well as *T. spenneroides* (Fig. 4 C–D) are described and illustrated. The calyx and corolla which are usually good characters in differentiating species, are so small in *Tapeinostemon* that they seem somewhat unreliable when dried as herbarium specimens for clear species differentiation. Therefore, seed anatomy is a useful character to distinguish these three species. The seeds of *Tapeinostemon* range in color from solid reddish brown to golden translucent and are minute (200–300 × 155–250 μm), globose, elliptic to ovoid, with a reticulate testa. The seeds of *T. adulans* and *T. spenneroides* are similar to that of two other neotropical genera, *Coutoubea* and *Schulnesia*, while the seeds of *T. zamoranum* appear similar to *Cicendia* (see photos in Bouman et al. 2002). The characteristics of these three species can be seen in Table 1.

Distribution and habitat.—*Tapeinostemon adulans* occurs in the diverse Chocó region on lower elevation Pacific-facing slopes of the Andes of northern Ecuador.

Etymology.—From the Latin, *adulans*, adulatory, for the collector of the type, Thomas B. Croat of the Missouri Botanical Garden.

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